

LISTING OF CLAIMS

This listing of claims will replace any prior versions, and listings, of claims in the application:

- 1 1. (currently amended) An MRAM cell comprising:
 - 2 a magnetic tunneling junction including
 - 3 a free layer,
 - 4 a pinned layer, and
 - 5 a spacer layer disposed between the free layer and the pinned layer;
 - 6 a digit line including a ~~bit~~ digit line segment disposed proximate to the magnetic
 - 7 tunneling junction;
 - 8 a bit line including a bit line segment in electrical contact with the magnetic
 - 9 tunneling junction; and
 - 10 a magnetic liner layer disposed entirely around the bit line segment and contacting
 - 11 the free layer.
- 1 2. (previously presented) The MRAM cell of claim 1 wherein the digit line segment is
 - 2 disposed proximate to the pinned layer and the bit line segment is in electrical
 - 3 contact with the free layer.
- 1 3. (previously presented) The MRAM cell of claim 1 wherein the bit line segment is
 - 2 disposed proximate to the pinned layer and the digit line segment is in electrical
 - 3 contact with the free layer.

1 4. (previously presented) The MRAM cell of claim 1 wherein the magnetic liner layer is
2 electrically conductive.

1 5. (previously presented) The MRAM cell of claim 1 wherein the bit and digit lines are
2 formed of a metal selected from the group consisting of Cu, W, and Al.

1 6. (previously presented) The MRAM cell of claim 1 further including an
2 antiferromagnetic layer disposed adjacent to the pinned layer.

1 7. (previously presented) The MRAM cell of claim 1 wherein the magnetic liner layer is
2 formed of Permalloy.

1 8. (previously presented) The MRAM cell of claim 7 wherein the Permalloy is between
2 16 and 22 atomic percent iron.

1 9. (previously presented) The MRAM cell of claim 7 wherein the Permalloy is $\text{Ni}_{81}\text{Fe}_{19}$.

1 10. (previously presented) The MRAM cell of claim 1 wherein the magnetic liner layer
2 has a thickness of about 20Å to about 500Å.

1 11. (previously presented) The MRAM cell of claim 1 wherein the magnetic liner layer
2 has a thickness of about 30Å to about 100Å.

- 1 12. (previously presented) The MRAM cell of claim 1 wherein the magnetic liner layer
2 is formed of a material selected from the group consisting of CoZrCr, CoZrNb,
3 CoZrRe, FeSiAl, FeN, FeAlN, FeRhN, and FeTaN.
- 1 13. (previously presented) The MRAM cell of claim 1 wherein the pinned layer is two
2 ferromagnetic layers separated by a spacer layer.
- 1 14. (previously presented) The MRAM cell of claim 1 wherein the free layer is two
2 ferromagnetic layers.
- 1 15. (currently amended) An MRAM cell comprising:
2 a magnetic tunneling junction including
3 a free layer having a magnetization orientation,
4 a pinned layer, and
5 an insulating spacer layer disposed between the free layer and the pinned
6 layer;
7 a digit line including a segment disposed proximate to the pinned layer;
8 a bit line including a segment in electrical contact with the free layer;
9 a magnetic liner layer disposed entirely around the bit line segment and contacting
10 the free layer such that a magnetic field encircles the bit line segment.
- 1 16. (previously presented) The MRAM cell of claim 15 wherein the magnetic liner layer
2 is electrically conductive.

- 1 17. (previously presented) The MRAM cell of claim 15 wherein the bit and digit lines
2 are formed of a metal selected from the group consisting of Cu, W, and Al.
- 1 18. (previously presented) The MRAM cell of claim 15 further including an
2 antiferromagnetic layer disposed adjacent to the pinned layer.
- 1 19. (previously presented) The MRAM cell of claim 15 wherein the magnetic liner layer
2 is formed of Permalloy.
- 1 20. (previously presented) The MRAM cell of claim 19 wherein the Permalloy is
2 between 16 and 22 atomic percent iron.
- 1 21. (previously presented) The MRAM cell of claim 19 wherein the Permalloy is
2 $\text{Ni}_{81}\text{Fe}_{19}$.
- 1 22. (previously presented) The MRAM cell of claim 15 wherein the magnetic liner layer
2 has a thickness of about 20Å to about 500Å.
- 1 23. (previously presented) The MRAM cell of claim 15 wherein the magnetic liner layer
2 has a thickness of about 30Å to about 100Å.
- 1 24. (previously presented) The MRAM cell of claim 15 wherein the pinned layer is two
2 ferromagnetic layers separated by a spacer layer.

1 25. (previously presented) The MRAM cell of claim 15 wherein the free layer is two
2 ferromagnetic layers.

1 26. (currently amended) An MRAM cell comprising:

2 a magnetic tunneling junction including

3 a free layer,

4 a pinned layer, and

5 an insulating spacer layer disposed between the free layer and the pinned
6 layer;

7 a digit line including a segment disposed proximate to the pinned layer, the digit
8 line segment having a long axis defining a first direction;

9 an electrically insulating spacer layer disposed between the digit line segment and
10 the pinned layer;

11 a bit line including a segment in electrical contact with the free layer, the bit line
12 segment having a long axis defining a second direction substantially
13 perpendicular to the first direction;

14 a magnetic liner layer disposed entirely around the bit line segment and contacting
15 the free layer.

1 27. (previously presented) The MRAM cell of claim 26 wherein the magnetic liner layer
2 is electrically conductive.

1 28. (previously presented) The MRAM cell of claim 26 wherein the bit and digit lines
2 are formed of a metal selected from the group consisting of Cu, W, and Al.

- 1 29. (previously presented) The MRAM cell of claim 26 further including an
2 antiferromagnetic layer disposed adjacent to the pinned layer.
- 1 30. (previously presented) The MRAM cell of claim 26 wherein the magnetic liner layer
2 is formed of Permalloy.
- 1 31. (previously presented) The MRAM cell of claim 30 wherein the Permalloy is
2 between 16 and 22 atomic percent iron.
- 1 32. (previously presented) The MRAM cell of claim 30 wherein the Permalloy is
2 $\text{Ni}_{81}\text{Fe}_{19}$.
- 1 33. (previously presented) The MRAM cell of claim 26 wherein the magnetic liner layer
2 has a thickness of about 20Å to about 500Å.
- 1 34. (previously presented) The MRAM cell of claim 26 wherein the magnetic liner layer
2 has a thickness of about 30Å to about 100Å.
- 1 35. (previously presented) The MRAM cell of claim 26 wherein the pinned layer is two
2 ferromagnetic layers separated by a spacer layer.
- 1 36. (previously presented) The MRAM cell of claim 26 wherein the free layer is two
2 ferromagnetic layers.

37 - 48. (cancelled)

1 49. (currently amended) An MRAM cell comprising:
2 a magnetic tunneling junction including
3 a free layer,
4 a pinned layer, and
5 an insulating spacer layer disposed between the free layer and the pinned
6 layer;
7 a digit line including a segment disposed proximate to the pinned layer, the digit
8 line segment having a long axis defining a first direction;
9 a bit line including a bit line segment in electrical contact with the free layer and
10 having a long axis defining a second direction substantially perpendicular
11 to the first direction; and
12 a magnetic sheath disposed entirely around the bit line segment and ~~formed from~~
13 magnetically coupled to the free layer ~~and a magnetic liner layer.~~

1 50. (previously presented) The MRAM cell of claim 49 wherein the magnetic liner layer
2 is electrically conductive.

1 51. (previously presented) The MRAM cell of claim 49 wherein the bit and digit lines
2 are formed of a metal selected from the group consisting of Cu, W, and Al.

- 1 52. (previously presented) The MRAM cell of claim 49 further including an
2 antiferromagnetic layer disposed adjacent to the pinned layer.
- 1 53. (previously presented) The MRAM cell of claim 49 wherein the magnetic liner layer
2 is formed of Permalloy.
- 1 54. (previously presented) The MRAM cell of claim 53 wherein the Permalloy is
2 between 16 and 22 atomic percent iron.
- 1 55. (previously presented) The MRAM cell of claim 53 wherein the Permalloy is
2 $\text{Ni}_{81}\text{Fe}_{19}$.
- 1 56. (previously presented) The MRAM cell of claim 49 wherein the magnetic liner layer
2 has a thickness of about 20Å to about 500Å.
- 1 57. (previously presented) The MRAM cell of claim 49 wherein the magnetic liner layer
2 has a thickness of about 30Å to about 100Å.
- 1 58. (previously presented) The MRAM cell of claim 49 wherein the pinned layer is two
2 ferromagnetic layers separated by a spacer layer.
- 1 59. (previously presented) The MRAM cell of claim 49 wherein the free layer is two
2 ferromagnetic layers.

60 - 88. (cancelled)